



Patent

**In the United States Patent and Trademark Office**

**In the Application of:** Brookhart et al.

**For:**  $\alpha$ -Olefins and Olefin Polymers and Processes Therefor

Application No. 09/887,273

Group Art Unit: 1713

Filed: June 22, 2001

Examiner: R. Rabago

Attorney Docket No.: CR9608USDIV9

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**APPEAL BRIEF**

Pursuant to 37 C.F.R. § 1.192, the following is a brief, in triplicate, in support of the Appeal filed July 3, 2003, appealing the Final Rejection dated March 5, 2003.

**AUTHORIZATION TO CHARGE DEPOSIT ACCOUNT**

Please charge the fee for the filing of this Brief in support of the Appeal to Deposit Account No. 04-1298.

**REAL PARTY IN INTEREST**

The real party in interest is E. I. du Pont de Nemours and Company.

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**RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences known to the Applicants, the Applicants' legal representative, or the assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the present Appeal.

**STATUS OF THE CLAIMS**

Claims 563-574 are pending and are the subject of this Appeal. Applicants affirm that all of claims 563-574 are to stand or fall together.

**STATUS OF AMENDMENT**

No amendment was made to the claims in response to the Final Rejection.

**SUMMARY OF THE INVENTION**

The present invention relates to processes for the production of polyolefins. The processes utilize transition metal catalysts. The processes involve a phenomenon unknown prior to the invention of the present processes, which leads to the formation of "abnormally" branched polymers, i.e., polymers having amounts and types of branching that differ from what would be predicted based on the prior art. The inventors recognized the operation of this phenomenon, now well-known and referred to as "chain walking", and invented the presently claimed processes for forming polyolefins. The results obtained were surprising and, as already recognized by the Examiner, unexpected.

**ISSUES**

Do claims 563-574 meet the requirements of 35 U.S.C. § 112 in providing a written description of the invention, and of the manner of making and

using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains to make and use the invention?

## ARGUMENT

### 1. The Final Rejection

In the Office Action dated March 5, 2003, the Examiner finally rejected claims 563-574 as not providing enablement for the full scope of catalyst formulations specified in the claims. In the final rejection, the Examiner referred to the previous Office Action, dated August 7, 2002, in which claims 563-574 were rejected and in which the Examiner had stated that the specification "includes no teaching that the claimed process could be performed with any catalyst other than one comprising nickel or palladium and a diimine coordinating ligand". In making this rejection, the Examiner appears to rely on an assertion that the "feature which distinguishes these claims over the teachings of the prior art is the making of a specifically branched polymer from monomers which the prior art has not recognized as being capable of rendering such a polymer". The Examiner further states that the "unique features of the polymer specified in the claims stem from the behavior of the catalyst, and such performance features are at odds with what those of ordinary skill in the art would expect when using other catalysts within the claimed scope". (August 7, 2002 Office Action, pages 4-5).

Applicants traversed the rejection in a Response filed on November 4, 2002, on the basis that the claimed process is carried out under certain polymerization conditions, disclosed within the present specification, that produce in the polymers an amount of branching that is outside the predicted number of branches, and that adequate guidance is provided in the specification for one skilled in the art to ascertain what modifications might be made to polymerization conditions to obtain the desired amount of branching in a polymer. Applicants cited the specification at page 90 beginning on line 15, which describes the effects of pressure and temperature on the degree of branching.

Applicants also cited certain Examples, which demonstrate the processes of the present invention with respect to catalysts containing other transition metals besides nickel and palladium.

In the Office Action dated July 5, 2003, the Examiner repeated the rejection of claims 563-574 and made the rejection final. Applicants appeal from the final rejection.

2. Applicants' Traversal of the Final Rejection

Claims 563-574 are directed to processes for the production of olefins having at least 50 branches per 1000 methylene groups and at least two branches of different lengths containing less than 6 carbons each. Despite the Examiner's apparent view that the claims are of broad scope, the claims in fact recite a number of specific requirements: the number of branches per 1000 methylene groups is 90% or less than the number of theoretical branches per 1000 methylene groups or 110% or more than the number of theoretical number of branches per methylene groups, or the polyolefin has 50 or more branches per 1000 methylene groups when theoretically no branches are predicted (claim 563); or, there are at least 50 branches per 1000 methylene groups, of the formula  $-(CH_2)_fG$  and/or there are less than 90% of the theoretical number of said branches per 1000 methylene groups or more than 110% of the theoretical number of said branches per 1000 methylene groups.

Thus, the claims recite processes for making polyolefins having types of branching that are unexpected and contrary to what would have been predicted based on the state of the art at the time the invention was made.

Examples 430-438 illustrate the effects of various parameters on the amount of branching obtained when catalysts containing cobalt are used for polymerization according to the processes of the present invention. In Example 430, a catalyst based on  $CoI_2$  was used to polymerize ethylene at a pressure of 140 kPa at room temperature, and the resulting polymer had 100 methyl groups per methylene. In Example 432, under the same conditions, polymerization using  $[(2,6-iPrPh)_2DABMe_2]CoMe_2$  yielded polyethylene having 115 methyl groups per methylene. Example 433 shows that, using the same catalyst, polymerization under an ethylene atmosphere of only 6.9 Mpa at lower temperatures produced a

polyethylene having 18 methyl per methylene. Applicants submitted, and continue to maintain, that the breadth of the scope of the examples provides support for the processes recited in claims 563-574, and the specification provides adequate teaching for one skilled in the art of polymerization utilizing transition metal catalysts to carry out the claimed processes. Thus, the Examples provide guidance to one skilled in the art as to how to vary the catalyst composition and the polymerization conditions in order to affect certain properties, particularly branching, of the polymers produced.

Applicants respectfully submit that the Examiner is allowing the unexpected advantages of the processes of the present invention to improperly influence his assessment of the disclosure and its support for the claims. As stated in Applicants' Response dated November 4, 2002, the fact that the degree of branching that can be obtained is different from what would be predicted is merely indicative of the surprising and unobvious results obtained by Applicants and recognized by the Examiner.

The Examiner has properly cited *In re Wright*, 999 F. 2d 1557 for the principle that the specification must teach one skilled in the art to make and use the invention without undue experimentation. As the Court of Appeals for the Federal Circuit has repeatedly stated, this principle does not preclude any experimentation that is within the purview of a person skilled in the art. Thus, it is submitted that, armed with a specification such as that of the present application, which discloses the effects on polymerization products of such variables as pressure and temperature and exemplifies the use of a variety of transition metal catalysts, a person skilled in the art of polymerizations utilizing transition metal catalysts would be readily able to deduce what the effects of varying the catalyst and conditions would be. Applicants respectfully urge that it is well within the purview of a skilled person to test a class of compounds, following the guidance provided by the examples in the present specification. Applicants further submit that a person skilled in the art would know how to test a compound for catalytic activity with regard to olefin polymerization. “The specification need not explicitly teach those in the art to make and use the invention; the requirement is satisfied if, given what they already know, the specification teaches those in the art enough that they can make and use the invention without ‘undue experimentation.’” *Amgen, Inc.. v. Hoechst Marion Roussell*, 314

F.3d 1313, 1334 (Fed. Cir. 2003), citing *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1365, (Fed. Cir. 1997) and *In re Vaeck*, 947 F.2d 488, 495, (Fed. Cir. 1991). In *Amgen*, the Court declined to overrule a finding that the claims were enabled when the specification enabled “at least one” method for producing erythropoietin that was not naturally occurring, and that a person skilled in the art could, following one of the examples in the patent, carry out the claimed invention. Similarly, one skilled in the art of polymerization could readily follow one or more of the examples in the present specification and carry out the present invention.

The need for experimentation on the part of one skilled in the art does not render a specification inadequate. The so-called “Wands factors”, set forth in *In re Wands*, 858 F.2d 731 (1988) have been applied in determining whether the degree of experimentation that might be required to practice an invention is undue.

Applicants submit that if the Wands factors are applied to the present specification, the specification clearly provides, in a manner readily understood by one skilled in the art of polymerization using transition metal catalysts, guidance on how to carry out the claimed processes. There are working examples present, which, Applicants submit, adequately exemplify the scope of the invention. Applicants submit that it is not required that examples be provided with regard to each and every aspect of the invention, and more particularly, with regard to each and every type of transition metal catalyst that can be used in the claimed processes.

Although several courts, including the Court of Appeals for the Federal Circuit, have alluded to the chemical arts as an “unpredictable” area, Applicants submit that it has long been recognized that, even for a process “dealing with a large class of substances”, the specification need only guide the person skilled in the art and can leave “something to the skill of persons applying the invention”. *Minerals Separation. v. Hyde*, 242 U.S. 261, 271 (S. Ct. 1916). Early disclosure is favored over requiring an inventor to test every variant of a process or composition. *In re Bundy*, 642 F.2d 430, 434 (CCPA 1981). Applicants further submit that the level of skill in the art of polymerization is adequate that one of skill can adapt polymerization processes, incorporating known principles, to vary the nature of catalysts used and polymerization conditions. In contrast to experimentation that might be required in order to practice inventions in more unpredictable or complex areas, such as

biotechnology, Applicants submit that the nature and degree of any experimentation that would be required in order to practice the present invention, including screening and testing of catalysts and variation of polymerization conditions, is routine for one skilled in the art, and such routine experimentation is not precluded by the enablement requirement.

Moreover, *In re Wright* also provides that the Examiner bears an initial burden of setting forth a reasonable explanation as to why he or she believes that the scope of the claim is not adequately enabled by the specification. Applicants respectfully submit that the Examiner has not met this initial burden because the final Office Action does not set forth sufficient reasons for doubting the enablement of the present claims by the specification. The principal reason for the alleged lack of enablement of the present claims is apparently the unexpectedness of the results obtained by the claimed polymerization processes. Applicants respectfully submit that an aspect of an invention that contributes to the patentability of that invention, particularly unexpected advantages of a claimed process, cannot properly be relied upon to assert the unpatentability of the claimed invention based on the fact that, due to the unexpected nature of the results of the process, some experimentation might be required. Applicants respectfully submit that the Examiner has not proffered evidence, such as teachings in pertinent references, which substantiate the Examiner's doubts that the scope of enablement of the present specification is commensurate with the claims. *In re Marzocchi*, 439 F.2d 220 (1971). Thus, Applicants submit, the present specification must be accepted as enabling.

As further indication that the present claims are enabled and are indeed entitled to a broad scope, Applicants submit that the present invention is a "pioneering" invention; that is, it stimulated a body of later work that led to, *inter alia*, later-developed patentable inventions. Inventors of such "pioneering", or "basic" inventions deserve "broad claims" and such inventions warrant "prompt, early disclosure". *In re Hogan*, 559 F.2d 595, 606 (CCPA, 1977). Such prompt, early disclosure precludes any requirement that each and every compound within the scope of the invention must be tested before a patent can be applied for and allowed. The contribution of the present invention to the state of the art of polymerization is evident in a number of later publications and patents, four of which are attached hereto as

Exhibits. Exhibit I is an article from the December 17, 1997 issue of *Chemical and Engineering News*, which reports the presentation of the 1998 Award for Cooperative Research in Polymer Science and Engineering to inventors of certain aspects of the present invention. As stated in the article, the award recognizes the innovation and development of polymeric materials or technology of significant importance. Also attached is Exhibit II, which is a review article published in *Chemical Reviews* in 2000. One of the authors of the article is an inventor of the present invention. Although other catalyst systems are discussed in the review article, this article cites a large number of publications in the field of late-metal catalysts used in ethylene polymerization through mid 1999, and illustrates the development of transition metal catalysts that can induce "abnormal" branching in polymers. Exhibit III is an article from the January 24, 2000 issue of *Chemical and Engineering News*. The article describes later work in polymerization of olefins and refers to the use of "sterically bulky" catalysts as being based on an approach developed by one of the present inventors. Exhibit IV is an article from the February 5, 1996 issue of *Chemical and Engineering News*, which describes a polyolefins business based on catalysts and technology of the present invention. Applicants submit that the amount of space devoted by *Chemical and Engineering News* and its designation of the subject matter as the "News of the Week" are indicative of the pioneering nature and significance of catalysts and processes of the present invention, as well as illustrative of the variety of ways to make and use such catalysts. Applicants submit that the body of work resulting from Applicants' invention is also indicative of the ability of persons skilled in the art to use the invention. Accordingly, Applicants submit that the present claims are entitled to a broad scope and that such scope is enabled by the present specification.

### CONCLUSION

For the reasons set forth above, the Board of Patent Appeals and Interferences is respectfully requested to reverse the final rejection of pending claims 563-574 and indicate allowability of all claims.

Respectfully submitted,

Dated:

By: Gail Dalickas

Gail A. Dalickas  
Reg. No.: 40,979  
Telephone: (302) 984-6282  
Facsimile: (302) 658-1192